

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellants:	Michael O. POLLEY et al.	§	Group Art Unit:	2611
		§		
Application No.:	10/723,215	§	Examiner:	Qutbuddin Ghulamali
		§		
Filed:	November 26, 2003	§	Confirmation No.	8507
		§		
For:	Frequency Domain	§	Atty. Docket No.	TI-36036
	Subchannel Transmit	§		(1962-08100)
	Antenna Selection and	§		
	Power Pouring for Multi-	§		
	Antenna Transmission	§		

APPEAL BRIEF

Mail Stop Appeal Brief—Patents

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Date: Jan. 19, 2010

Sir:

Appellants hereby submit this Appeal Brief in connection with the above-identified application. A Notice of Appeal was electronically filed on November 20, 2009.

TABLE OF CONTENTS

REAL PARTY IN INTEREST	3
I. RELATED CASES, APPEALS AND INTERFERENCES	4
V. SUMMARY OF THE CLAIMED SUBJECT MATTER	7
VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL	11
VII. ARGUMENT	12
A. Rejections under 35 U.S.C. § 103(a)	12
1. Claims 1-8	12
2. Claims 9-11, and 17	13
3. Claims 13-16, and 18-22	14
4. Claim 25	15
5. Claim 26	15
B. Conclusion	16
VIII. CLAIMS APPENDIX	17
IX. EVIDENCE APPENDIX	25
X. RELATED PROCEEDINGS APPENDIX	26

REAL PARTY IN INTEREST

The real party in interest is the Assignee of the inventors to Texas Instruments Incorporated, a Delaware corporation, having its principal place of business in Dallas, Texas as reflected in the assignment recorded on Reel 014790 at Frame 0691.

I. RELATED CASES, APPEALS AND INTERFERENCES

There was a prior appeal:

Notice of Appeal filed on June 27, 2008.

The Appeal Brief was filed on August 27, 2008.

Response to Appeal Brief was reopening of prosecution and new grounds for rejection.

III. STATUS OF THE CLAIMS

Originally filed claims: 1-26.

Claim cancellations: 12 and 23-24.

Added claims: None.

Presently pending claims: 1-11, 13-22, 25 and 26.

Presently appealed claims: 1-11, 13-22, 25 and 26.

Claims 1-11, 13-22, 25 and 26 stand finally rejected as noted in Final Action with Notification Date of August 20, 2009.

Claims 1-7, 9-11, 13-22, 25 and 26 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Raleigh et al. (United States Patent Number 6,144,711) in view of Yun (United States Patent Publication 2007/0173277).

Claim 8 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Raleigh et al. (United States Patent Number 6,144,711) in view of Yun (United States Patent Publication 2007/0173277) and further in view of Kim et al. (United States Patent Number 7,366,247).

IV. STATUS OF THE AMENDMENTS

No claims were amended after the Final Office action with Notification Date of August 20, 2009.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

The claimed subject matter provides a technique for enabling a multiple-antenna WLAN device to achieve performance improvements when communicating with a single-antenna WLAN device or when communicating with a multiple-antenna WLAN device operating in a single-antenna mode. **{P. 7, II. 4-10}**. In general, the technique is directed to generating a weighting vector for transmissions signals that indicates the relative transmission power to be used for each sub-channel in the transmission. **{P. 11, I. 18 – p. 13, I. 23}**.

Claim 1 is directed to A multiple-antenna wireless device (200, 420, 528) that communicates with a single-antenna enabled device across a spectrum having a plurality of sub-channels. **{Figs. 2, 4, 5; p. 9, II. 15-21}**. The wireless device comprises a plurality of antennas (202, 204, 416, 418, 524, 526) through which the multiple-antenna wireless device communicates with a single-antenna enabled device wireless device (206, 426, 528), where each antenna of the plurality of antennas communicates with the single-antenna enabled device wireless device via an associated communication pathway between a subset of the plurality of antennas on the multiple-antenna wireless device and an antenna on the single-antenna enabled device (210, 212). **{Figs. 2, 4, 5; p. 10, I. 21 – p. 11, I. 17}**. The device also comprises sub-channel power analysis logic (402, 502) coupled to the plurality of antennas and adapted to determine a communication quality for at least two communication pathways and determine which communication pathway has a highest communication quality on a sub-channel by sub-channel basis. **{Figs. 4, 5; p. 14, II. 6-8; p. 15, II. 3-6}**. The device further comprises diversity selection logic (404, 504) coupled to the sub-channel power analysis logic and adapted to determine an antenna chain weighting vector for an associated antenna chain based on the highest communication quality. *Id.* The antenna chain weighting vector specifies a relative transmission power for each sub-channel for the associated antenna chain. **{P6 I 16-18; P. 11, I. 18 – p. 13, I. 23}**.

Claim 9 is directed to a method for a multiple-antenna device communicating with a single-antenna enabled device that comprises receiving data transmitted from the single-antenna enabled device wireless device (206, 426, 528) to a second wireless device (200, 420, 528) using a plurality of antennas (202, 204, 416, 418, 524, 526) at the

second wireless device. **{Figs. 2, 4, 5; p. 10, l. 21 – p. 11, l. 17}**. Each antenna of the plurality of antennas communicates with the single-antenna enabled wireless device via an associated communication pathway (210, 212). *Id.* The method also comprises replicating a single antenna transmit signal in order to permit the second wireless device to communicate with the single-antenna enabled wireless device. **{Fig. 3; p. 13, l. 10 – 17}**. The method also comprises determining a plurality of channel characteristics associated with each antenna of the plurality of antennas. **{P. 7, ll. 17-24}**. The method further comprises, on a per sub-channel basis, computing a antenna chain weighting vector for each antenna chain for each sub-channel based on the channel characteristics. **{P. 10, ll. 4-6}**. This computation includes representing the antenna chain weighting vector using a plurality of bits, each bit corresponding to an antenna chain in a different sub-channel, and each bit indicating whether an antenna chain associated with the weighting vector is used to transmit data on the corresponding sub-channel. **{P. 10, ll. 4-20}**. The computation also comprises, for each communication pathway, combining a transmission signal in each transmit antenna chain with the antenna chain weighting vector for that antenna chain to form a plurality of weighted transmission signals. **{P. 13, ll. 13-17}**. The computation further comprises concurrently transmitting to the single-antenna enabled device the weighted transmission signal in each transmit antenna chain from the second wireless device to the single antenna enabled wireless device via a plurality of communication pathways. *Id.*

Claim 13 is directed to a method for a multiple-antenna device communicating with a single-antenna enabled device that comprises receiving data transmitted from a single-antenna enabled wireless device (206, 426, 528) to a second wireless device (200, 420, 528) using a plurality of antennas (202, 204, 416, 418, 524, 526) at the second wireless device. **{Figs. 2, 4, 5; p. 10, l. 21 – p. 11, l. 17}**. Each antenna of the plurality of antennas communicates with the single-antenna enabled wireless device via an associated communication pathway (210, 212). *Id.* The method also comprises determining a plurality of channel characteristics associated with each antenna chain in each sub-channel. **{P. 7, ll. 17-24}**. The method further comprises representing the antenna chain weighting vector in a ratio format. **{P. 11, ll. 20-23}**. The ratio format specifies an amount of power to be applied to an antenna chain associated with the antenna chain weighting vector for the antenna chain for each sub-channel. **{P. 11, l. 18**

– **p. 13, I. 9**}. For each communication pathway, the method includes combining a transmission signal in each transmit antenna chain with the antenna chain weighting vector to form a plurality weighted transmission signals and concurrently transmitting to the single-antenna enabled device each the weighted transmission signal in each transmit antenna chain from the second wireless device to the single antenna enabled wireless device via a plurality of communication pathways. **{P. 13, II. 13-17}**.

Claim 18 is directed to a system that comprises an access point (200, 420, 528) having a plurality of antennas (202, 204, 416, 418, 526, 528) and a wireless station (206, 426, 528) in communication with the access point via a single antenna (208) in the wireless station. **{Figs. 2, 4, 5; p. 6, II. 11 – p. 7, I. 7}**. The plurality of antennas in the access point receive a data signal from the single antenna in the wireless station via a plurality of communication pathways (210, 212), and each communication pathway comprises a plurality of sub-channels. **{P. 6, I. 18 – p. 7, I. 2}**. The access point determines channel characteristics and a antenna chain weighting vector for each antenna of the plurality of antennas, with each antenna chain weighting vector being indicative of an amount of power to be provided to each sub-channel for an associated antenna chain. **{P. 10, II. 4-20}**. The access point reproduces a data transmission signal, combines each copy of the data transmission signal with a different antenna chain weighting vector to produce a plurality of weighted transmission signals, and transmits each weighted transmission signal to the wireless station via a separate communication pathway. **{P. 13, II. 13-17}**.

Claim 25 is directed to a method for a multiple-antenna device communicating with a single-antenna enabled device that comprises, for each of a plurality of antennas (202, 204, 416, 418, 524, 526), determining a communication quality of each sub-channel of a communication pathway, the communication pathway comprising a plurality of sub-channels. **{Figs. 2, 4, 5; p. 14, II. 6-8; p. 15, II. 3-6}**. The method also comprises, for each sub-channel, selecting an antenna chain from a plurality of antennas and providing power to each antenna chain of the plurality of antennas based on the number of data transmissions since the communication quality was most recently determined. **{P. 13, II. 4-7}**. The method further includes concurrently transmitting data via the plurality of

antennas across the plurality of sub-channels via an antenna chain for a given sub channel. **{P. 13, II. 13-17}**.

Claim 26 is directed to a method for a multiple-antenna device communicating with a single-antenna enabled device that includes, for each of a plurality of antennas (202, 204, 416, 418, 524, 526), determining a communication quality of each sub-channel of a communication pathway, with the communication pathway comprising a plurality of sub-channels. **{Figs. 2, 4, 5; p. 14, II. 6-8; p. 15, II. 3-6}**. The method also comprises, for each sub-channel, selecting an antenna chain from a plurality of antennas and providing power to each antenna chain of the plurality of antennas based on the amount of time elapsed since the communication quality was most recently determined. **{P. 11, II. 18-21}**. The method further comprises concurrently transmitting data via the plurality of antennas across the plurality of sub-channels via an antenna chain for a given sub channel. **{P. 13, II. 13-17}**.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether under 35 U.S.C. § 103(a) claims 1-7, 9-11, 13-22, 25 and 25 are obvious in view of Raleigh (United States Patent Number 6,144,711) and Yun (United States Patent Publication 2007/0173277).

Whether under 35 U.S.C. § 103(a) claim 8 is obvious in view of Raleigh (United States Patent Number 6,144,711), Yun (United States Patent Publication 2007/0173277), and Kim et al. (United States Patent Number 7,366,247).

VII. ARGUMENT

A. Rejections under 35 U.S.C. § 103(a)

1. Claims 1-8

Claims 1-7 stand rejected as allegedly obvious in view of Raleigh and Yun. Claim 8 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Raleigh et al. (United States Patent Number 6,144,711) in view of Yun (United States Patent Publication 2007/0173277) and further in view of Kim et al. (United States Patent Number 7,366,247). Appellants traverse these rejections. Claim 1 is representative of this group of claims. The grouping should not be construed to mean the patentability of any of the claims may be determined in later actions (*e.g.*, actions before a court) based on the groupings. Rather, the presumption of 35 USC § 282 shall apply to each of these claims individually.

Claim 1 recites, *inter alia*, “sub-channel power analysis logic which determines which communication pathway has a highest communication quality on a sub-channel by sub-channel basis and requires “wherein the antenna chain weighting vector specifies a relative transmission power for each sub-channel for the associated antenna chain.” As with the previous appeal and as Appellants have pointed out numerous times, the art the Examiner cites including Yun is directed to signal quality processors technology for receivers. Yun appears to make absolutely no mention of the term “sub-channel” nor transmitting power for individual sub-channels nor even antenna weighting vectors in a transmission context, as required by claim 1. Given that Raleigh fails to teach the above limitation and that Yun cannot possibly teach this limitation of power analysis on a sub-channel by sub-channel basis, the combination of Raleigh and Yun cannot and does not teach the above limitation.

Examiner in a response to remarks in amendment filed 5/19/2009, writes that Yun discloses both a transmitter and a receiver. However, the signal quality processor is only in the receiver of Yun. Furthermore, Examiner cites page 15 section 0129 of Yun and points to c.sub.i values, citing that the index *i* is for every downlink connection—the *i* in Yun is for each transmit antenna and not a sub-channel. The Examiner also errs in equating an antenna chain as an array. Applicants have defined antenna chain as a communication pathway between an antenna on a multiple-antenna

WLAN device and an antenna on a single-antenna WLAN device (page 6, line 16-18 of Applicants' application).

Appellants strongly and respectfully urge that Board to carefully consider the Examiner's citations to Yun. Appellants are confident that the Board will agree that Yun, alone or in combination with Raleigh, fails to teach or even suggest the limitations in question.

For at least these reasons, the Examiner erred in rejecting claim 1. Thus, Appellants respectfully ask the Board to reverse the Examiner's rejection of all claims in claim 1's group and set the claims for issue.

2. Claims 9-11, and 17

Claims 9-11, and 17 stand rejected as allegedly obvious in view of Raleigh and Yun. Appellants traverse this rejection. Claim 9 is representative of this group of claims. The grouping should not be construed to mean the patentability of any of the claims may be determined in later actions (e.g., actions before a court) based on the groupings. Rather, the presumption of 35 USC § 282 shall apply to each of these claims individually.

Claim 9 requires, *inter alia*, "on a per sub-channel basis, computing an antenna chain weighting vector for each antenna chain for each sub-channel based on the channel characteristics." Claim 9 further requires that the computing comprises "representing the antenna chain weighting vector using a plurality of bits, each bit corresponding to an antenna chain in a different sub-channel, and each bit indicating whether an antenna chain associated with the weighting vector is used to transmit data on the corresponding sub-channel." Raleigh fails to teach or even suggest this limitation.

The Examiner asserts that Raleigh discloses this limitation at col. 2, ll. 1-15, col. 6, ll. 42-67, and col. 8, ll. 40-58. Applicants now explain why each of these citations fails to teach the limitation referenced above.

Col. 2, ll. 1-15 of Raleigh merely mention that multiple transmitter/receiver elements may be used. Col. 6, ll. 42-67 of Raleigh discuss spatial processing, in which one or more symbols that are to be transmitted are multiplied with one or more spatial vector weights. This portion of Raleigh further describes optimization of spatial vector weights so as to minimize interference between sub-channels. Col. 8, ll. 40-58 also

describes optimization of vector weights. Although these citations do appear to discuss vector weights, sub-channels, etc., they still fail to teach or suggest the determination of a weighting vector for multiple antennas, with each vector comprising multiple bits, each bit indicating whether the antenna corresponding to that vector is used to transmit data on the sub-channel associated with that bit (as required by claim 9). Raleigh's mere application of vector weights to transmission signals (and Raleigh's adjustment of the vector weights) does not meet the limitations of claim 9.

Examiner cites that Yun discloses "on a per sub-channel basis, computing a weighting vector for each antenna of the plurality of antennas." Examiner has been unresponsive to the amendment of claim 9 which was " ...on a per sub-channel basis, computing an antenna chain weighting vector for each antenna chain for each sub-channel of the plurality of antennas based on the channel characteristics... "

For at least these reasons, the Examiner erred in rejecting claim 9. Thus, Appellants respectfully ask the Board to reverse the Examiner's rejection of all claims in claim 9's group and set the claims for issue.

3. Claims 13-16, and 18-22

Claims 13-16, and 18-22 stand rejected as allegedly obvious in view of Raleigh and Yun. Appellants traverse this rejection. Claim 13 is representative of this group of claims. The grouping should not be construed to mean the patentability of any of the claims may be determined in later actions (*e.g.*, actions before a court) based on the groupings. Rather, the presumption of 35 USC § 282 shall apply to each of these claims individually.

Claim 13 requires, *inter alia*, "representing an antenna chain weighting vector in a ratio format; wherein the ratio format specifies the amount of power to be applied to an antenna chain associated with the antenna chain weighting vector for the antenna chain for each sub-channel."

Claim 18 requires, *inter alia*, "access point determines channel characteristics and a antenna chain weighting vector for each antenna of the plurality of antennas, each antenna chain weighting vector being indicative of an amount of power to be provided to each sub-channel for an associated antenna chain."

Examiner cites page 3, section 0027 and page 14 section 0126 of Yun as disclosing an amount of power to be applied to antenna associated with the weighting vector for each sub-channel. Yun appears to make absolutely no mention of the term “sub-channel” nor amount of power to be applied to an antenna chain associated with the antenna chain weighting vector for the antenna chain for each sub-channel, as required by claim 13. For claims 13 and 18, Examiner has failed to take into consideration antenna chain and antenna chain weight vector limitations.

For at least these reasons, the Examiner erred in rejecting claim 13 and 18. Thus, Appellants respectfully ask the Board to reverse the Examiner’s rejection of all claims in claims 13’s group and set the claims for issue.

4. Claim 25

Claim 25 stands rejected as allegedly obvious in view of Raleigh and Yun. Appellants traverse this rejection.

Claim 25 requires “providing power to each antenna chain of the plurality of antennas based on the number of data transmissions since the communication quality was most recently determined.” The Examiner has admitted that Raleigh fails to teach or suggest this limitation. Examiner has cited Yun page 4 sections 0028 and 0029 as teaching this limitation. Again the Examiner has failed to address the claims as amended and the limitation of antenna chain.

For at least these reasons, the Examiner erred in rejecting claim 25. Thus, Appellants respectfully ask the Board to reverse the Examiner’s rejection of claim 25 and set the claim for issue.

5. Claim 26

Claim 26 stands rejected as allegedly obvious in view of Raleigh and Yun. Appellants traverse this rejection.

Claim 26 requires “providing power to each antenna chain of the plurality of antennas based on the amount of time elapsed since the communication quality was most recently determined.” The Examiner admits that Raleigh fails to teach this limitation. The Examiner has admitted that Raleigh fails to teach or suggest this limitation. Examiner has

cited Yun page 4 sections 0028 and 0029 as teaching this limitation. Again the Examiner has failed to address the claims as amended and the limitation of antenna chain.

For at least these reasons, the Examiner erred in rejecting claim 26. Thus, Appellants respectfully ask the Board to reverse the Examiner's rejection of claim 26 and set the claim for issue.

B. Conclusion

For the reasons stated above, Appellants respectfully submit that the Examiner erred in rejecting all pending claims. It is believed that no extensions of time or fees are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 C.F.R. § 1.136(a), and any fees required (including fees for net addition of claims) are hereby authorized to be charged to Texas Instruments Incorporated's Deposit Account No. 20-0668.

Respectfully submitted:

/Steven A. Shaw/

January 19, 2010

Steven A. Shaw
Reg. No.: 39,368

Customer No.: 23494
TEXAS INSTRUMENTS INCORPORATED
P.O. Box 655474, M.S. 3999
Dallas, TX 75265
Telephone: (972) 917-5137
Facsimile: (972) 917-4418
email: steven-shaw@ti.com

VIII. CLAIMS APPENDIX

1. (Previously Presented) A multiple-antenna wireless device that communicates with a single-antenna enabled device across a spectrum having a plurality of sub-channels, said multiple-antenna wireless device comprising:

a plurality of antennas through which the multiple-antenna wireless device communicates with the single-antenna enabled device wireless device, each antenna of the plurality of antennas communicates with the single-antenna enabled device wireless device via an associated communication pathway between a subset of the plurality of antennas on the multiple-antenna wireless device and an antenna on the single-antenna enabled device;

sub-channel power analysis logic coupled to the plurality of antennas and adapted to determine a communication quality for at least two communication pathways and determine which communication pathway has a highest communication quality on a sub-channel by sub-channel basis; and

diversity selection logic coupled to the sub-channel power analysis logic and adapted to determine an antenna chain weighting vector for an associated antenna chain based on the highest communication quality, wherein the antenna chain weighting vector specifies a relative transmission power for each sub-channel for the associated antenna chain.

2. (Previously Presented) The device of claim 1, wherein the antenna chain weighting vector for the associated antenna comprises a plurality of bits, each bit corresponding to one sub-channel, and each bit indicating whether the associated antenna is used to transmit on the corresponding sub-channel.

3. (Previously Presented) The device of claim 1, wherein the antenna chain weighting vector represented in a proportional format comprises a plurality of values, each value corresponding to a sub-channel and each value being indicative of an amount of power to be provided to the associated antenna.

4. (Original) The device of claim 3, wherein the amount of power to be provided to an antenna is determined by the number of signal transmissions since the communication quality for each sub-channel of the associated communication pathway was most recently determined.

5. (Original) The device of claim 3, wherein the amount of power to be provided to an antenna is based on the communication quality of each sub-channel in the associated communication pathway.

6. (Original) The device of claim 3, wherein the amount of power to be provided to an antenna is determined by the amount of time elapsed since the communication quality for each sub-channel of the associated communication pathway was most recently determined.

7. (Original) The device of claim 1, wherein the wireless device may wirelessly communicate with a plurality of wireless stations.

8. (Original) The device of claim 1, further comprising a signal splitter coupled to the diversity selection logic and adapted to reproduce signals to be transmitted.

9. (Previously Presented) A method for a multiple-antenna device communicating with a single-antenna enabled device, comprising:

receiving data transmitted from a the single-antenna enabled wireless device to a second wireless device using a plurality of antennas at the second wireless device, wherein each antenna of the plurality of antennas communicates with the single-antenna enabled wireless device via an associated communication pathway transmit antenna chain;

determining a plurality of channel characteristics associated with each antenna of the plurality of antennas;

replicating a single antenna transmit signal in order to permit the second wireless device to communicate with the single-antenna enabled wireless device;

on a per sub-channel basis, computing an antenna chain weighting vector for each antenna chain for each sub-channel based on the channel characteristics, comprising:

representing the antenna chain weighting vector using a plurality of bits, each bit corresponding to an antenna chain in a different sub-channel, and each bit indicating whether an antenna chain associated with the weighting vector is used to transmit data on the corresponding sub-channel;

for each communication pathway, combining a transmission signal in each transmit antenna chain with the antenna chain weighting vector for that antenna chain to form plurality of a weighted transmission signals;

and

concurrently transmitting to the single-antenna enabled device each the weighted transmission signal in each transmit antenna chain from the second

wireless device to the single antenna enabled wireless device via a plurality of communication pathways.

10. (Previously Presented) The method of claim 9, wherein the single-antenna enabled wireless device transmits data to a plurality of wireless devices and receives data from a plurality of wireless devices.

11. (Previously Presented) The method of claim 9, wherein each antenna chain weighting vector specifies a relative transmission power for the antenna chain for each sub-channel.

12. (Cancelled).

13. (Previously Presented) A method for a multiple-antenna device communicating with a single-antenna enabled device, comprising:

receiving data transmitted from a single-antenna enabled wireless device to a second wireless device using a plurality of antennas at the second wireless device, wherein each antenna of the plurality of antennas communicates with the single-antenna enabled wireless device via an associated communication pathway;

determining a plurality of channel characteristics associated with each antenna chain in each sub-channel;

representing an antenna chain weighting vector in a ratio format;

wherein the ratio format specifies the amount of power to be applied to an antenna chain associated with the antenna chain weighting vector for the antenna chain for each sub-channel;

for each communication pathway, combining a transmission signal in each transmit antenna chain with the antenna chain weighting vector to form a plurality of weighted transmission signals; and
concurrently transmitting to the single-antenna enabled device each the weighted transmission signal in each transmit antenna chain from the second wireless device to the single antenna enabled wireless device via a plurality of communication pathways.

14. (Previously Presented) The method of claim 13, wherein specifying the amount of power to be applied to an antenna chain is based on the communication quality of each antenna chain for each sub-channel.

15. (Previously Presented) The method of claim 14, wherein specifying the amount of power to be applied to each antenna chain is further based on the number of data transmissions since the communication quality of the antenna chain for a given sub channel was most recently determined.

16. (Previously Presented) The method of claim 14, wherein specifying the amount of power to be applied to each antenna chain is further based on the amount of time elapsed since the communication quality of the antenna chain for a given sub channel was most recently determined.

17. (Previously Presented) The method of claim 9, wherein channel characteristics comprise a signal-to-noise ratio.

18. (Previously Presented) A system, comprising:
- an access point having a plurality of antennas; and
 - a wireless station in communication with the access point via a single antenna in the wireless station;
- wherein the plurality of antennas in the access point receive a data signal from the single antenna in the wireless station via a plurality of communication pathways, each communication pathway comprising a plurality of sub-channels;
- wherein the access point determines channel characteristics and an antenna chain weighting vector for each antenna of the plurality of antennas, each antenna chain weighting vector being indicative of an amount of power to be provided to each sub-channel for an associated antenna chain;
- wherein the access point reproduces a data transmission signal, combines each copy of the data transmission signal with a different antenna chain weighting vector to produce a plurality of weighted transmission signals, and transmits each weighted transmission signal to the wireless station via a separate communication pathway.
19. (Previously Presented) The system of claim 18, wherein the antenna chain weighting vector comprises a plurality of bits, each bit corresponding to one sub-channel, and each bit indicating whether an antenna associated with the antenna chain weighting vector is used to transmit on the corresponding sub-channel.
20. (Previously Presented) The system of claim 18, wherein the antenna chain weighting vector comprises a plurality of values, each value corresponding to a sub-

channel and each value being representative of an amount of power to be applied to an antenna associated with the antenna chain weighting vector.

21. (Original) The system of claim 20, wherein the amount of power to be applied to a particular antenna for a particular sub-channel is based on the number of data transmissions since the quality of the associated communication pathway was last determined; and

wherein the amount of power to be provided to a particular antenna for a particular sub-channel is further based on the signal-to-noise ratio associated with that antenna.

22. (Original) The system of claim 20, wherein the amount of power to be applied to a particular antenna for a particular sub-channel is based on the amount of time elapsed since the quality of the associated communication pathway was last determined; and

wherein the amount of power to be provided to a particular antenna for a particular sub-channel is further based on the signal-to-noise ratio associated with that antenna.

23. (Cancelled).

24. (Cancelled).

25. (Previously Presented) A method for a multiple-antenna device communicating with a single-antenna enabled device, said method comprising:
- for each of a plurality of antennas, determining a communication quality of each sub-channel of a communication pathway, the communication pathway comprising a plurality of sub-channels;
 - for each sub-channel, selecting an antenna chain from a plurality of antennas and providing power to each antenna chain of the plurality of antennas based on the number of data transmissions since the communication quality was most recently determined; and
 - concurrently transmitting data via the plurality of antennas across the plurality of sub-channels via an antenna chain for a given sub channel.
26. (Previously Presented) A method for a multiple-antenna device communicating with a single-antenna enabled device, said method comprising:
- for each of a plurality of antennas, determining a communication quality of each sub-channel of a communication pathway, the communication pathway comprising a plurality of sub-channels;
 - for each sub-channel, selecting an antenna chain from a plurality of antennas and providing power to each antenna chain of the plurality of antennas based on the amount of time elapsed since the communication quality was most recently determined; and
 - concurrently transmitting data via the plurality of antennas across the plurality of sub-channels via an antenna chain for a given sub channel.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.